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(54) **Closure system for bottles**

(57) A closure (1) for bottles (2) and the like is provided with deformable sealing members comprising an annular flange (18) which produces a seal within the bottle, an annular lip (22) which produces a seal external to the bottle and at least one annular ribbing (26) disposed between the flange (18) and the lip (22) which

produces a head seal, being squeezed onto an annular rim (3") of the bottle (2).

The closure (1) is characterized in that the annular lip (22), in the state of engagement of the closure with the bottle (2), is flexed, in a manner such as to create a state of deformation at the ribbing (26) which thrusts the said ribbing against the annular rim (3") of the bottle (2).

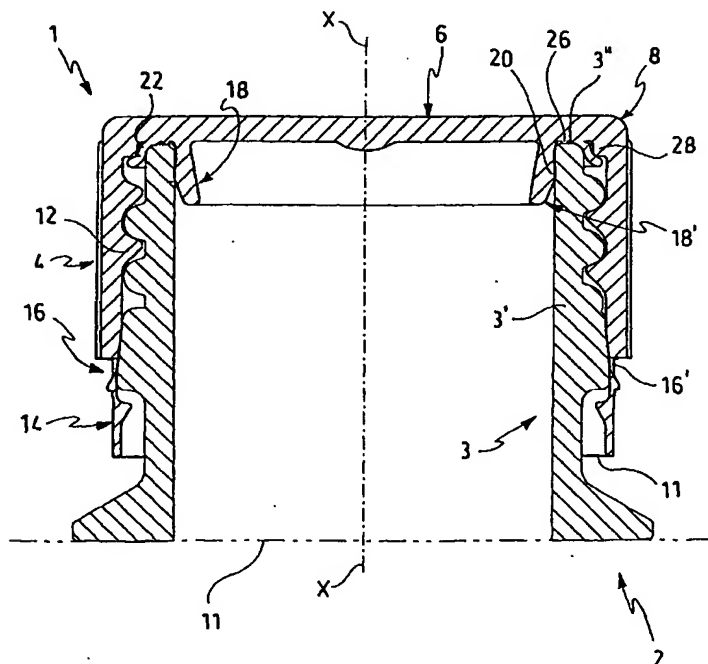


FIG.2

Description

[0001] The present invention relates to a closure system for a bottle, a container and the like, particularly for containers or bottles containing gaseous beverages or water.

[0002] It is known that in the sector of gaseous beverages and waters, the bottling of the product plays a fundamental part affecting its preservation, transportation and ease of consumption by the end user.

[0003] In particular, it is necessary that the closure used for the bottles is able to maintain within the container the balance between the gases released and the gases dissolved in the product.

[0004] It is known, specifically, that a small quantity of dissolved gases is inevitably released until such time as a stable balance is established within the container between the pressure of the released gases and the pressure of the dissolved gases.

[0005] If the sealing properties of the closure of the bottle are not optimal, a proportion of the released gases escapes to the exterior atmosphere, lowering the pressure of the gases inside the bottle and causing the release of other dissolved gases from the product.

[0006] It is known to produce closure systems for bottles provided with sealing members. For example, it is known to produce a cap comprising a base provided with a deformable annular flange projecting axially from the base which produces a seal within the bottle, a flexible annular shoulder projecting radially from the shell of the cap which produces an external seal and annular ribbings projecting axially from the base which produce a head seal on the annular rim of the bottle.

[0007] A closure produced as described above is, for example, described in document EP 0 119 055.

[0008] However, a closure produced in accordance with the teachings of the known art does not ensure a high degree of efficiency of sealing of all the deformable members except as a consequence of strong tightening of the cap on the bottle, resulting, inevitably, in an excessive effort on the part of a user who is attempting to open the bottle by disengaging it from the closure, especially on first opening.

[0009] In particular, in the case of sealing members which produce a head seal on the ledge of the neck of the bottle, the sealing effect is produced solely by the squeezing of such ribbings, so that the sealing effect is noticeable only after appropriate tightening of the cap.

[0010] There is therefore a perceived need to produce a closure system for a bottle, a container and the like which possesses a high sealing efficiency, in order to maintain the gaseous effect unchanged and to ensure good preservation of the product. At the same time, there is a perceived need to produce a closure which offers significant ease of use to the end user, requiring no excessive efforts for the first disengagement of the closure from the bottle.

[0011] The object underlying the present invention is

that of selecting a closure system which offers structural and functional features such as to satisfy the abovementioned requirements and at the same time to eliminate the disadvantages to which reference has been made in connection with the known art.

[0012] This object is achieved by a closure system in accordance with Claim 1.

[0013] Further features and advantages of the closure system in accordance with the present invention will become apparent from the description provided below of a preferred embodiment thereof, given by way of indication and without implying any limitation, with reference to the attached drawings, in which:

[0014] Figure 1 represents a cross section of the closure system;

[0015] Figure 2 represents a cross section of the sealing system in accordance with Figure 1 associated with a bottle.

[0016] With reference to the attached drawings, the reference numeral 1 refers as a whole to a closure system capable of association with a bottle 2 or with a container and the like.

[0017] The closure 1 comprises a shell 4 and a base 6 which produces an upper covering base for the said shell. The base 6 is solidly fixed to the said shell by means of a zone of connection 8. Preferably, the shell 4 and the base 6 possess substantially cylindrical symmetry and extend about an axis X-X.

[0018] The shell 4 and the base 6 define, at least in part, a space 10 which produces the interior space for the closure 1 and can receive an end portion 3' of a neck 3 of the bottle 2. The said space 10 is accessible from the outside through an aperture 11, which can be passed through by the said end portion 3' of the neck 3 of the bottle 2.

[0019] In a preferred embodiment of the closure 1, the shell 4 is provided with an internal threading 12 which extends at least in part over the interior surface of the said shell.

[0020] The said threading constitutes an example of embodiment of engagement means for the engagement of the closure 1 with the bottle 2. In further embodiments of the closure 1, the said engagement means are produced, for example, by snap-fitting devices.

[0021] In a further embodiment, the shell 4 is connected to a safety strip 14, produced solidly fixed to the shell 4 by means of a weakened portion 16 of material. Preferably, the said weakened portion is produced by a plurality of connecting webs 16', disposed in accordance with a circumferential succession.

[0022] The weakened portion 16 and the safety strip 14 constitute, in accordance with the terminology customary in the sector of closures for bottles, a "tamper evident" system.

[0023] On first opening of the closure 1 of the bottle 2, the weakened portion 16, or the webs 16', are intended to tear, to permit the disengagement of the closure from the bottle and show that opening of the said bottle

has taken place.

[0024] In the vicinity of an end zone of the shell 4 of the closure 1, the base 6 is solidly fixed to the said shell by means of the connection zone 8.

[0025] The said base is provided, towards the interior space 10 of the closure, with a deformable annular flange 18 projecting from the said base and, in a state of engagement of the closure 1 with the bottle 2, producing, by undergoing deformation, a seal within the said bottle.

[0026] In an embodiment of the closure 1, the flange 18 projects from the base 6 substantially in the direction of the axis X-X of the closure 1.

[0027] Preferably, in the undeformed state, the said flange extends in the direction of the axis X-X of the closure with configuration that is substantially frustum-shaped, in other words widening towards the aperture 11 of the closure 1.

[0028] In a further embodiment, the flange 18 provides a shaped exterior surface 18'. Preferably, the said exterior surface 18' is shaped in a manner such as to appear swollen towards the centre line, or the longitudinal central part, of the said flange, to the point of resulting in an annular swelling 20, preferably in the vicinity of the centre line of the said exterior surface of the flange 18.

[0029] The base 6 of the closure 1 comprises, in addition, an annular lip 22 projecting from the said base and, in the state of engagement of the closure 1 with the bottle 2, producing, by undergoing deformation, a seal external to the said bottle.

[0030] In an embodiment of the closure 1, the lip 22 projects from the base 6 substantially in the direction of the axis X-X of the closure 1.

[0031] In one embodiment, in the undeformed state, the said lip extends in the direction of the axis X-X of the closure 1 with an appearance widening towards the aperture 11 of the closure 1, preferably in accordance with a "comma" configuration.

[0032] The lip 22 is spaced radially from the flange 18, preferably towards the outside of the flange 18 relative to the axis X-X. The flange 18 and the lip 22 define, at least in part, an annular space 24.

[0033] Between the annular flange 18 and the annular lip 22 is disposed at least one annular ribbing, projecting from the base 6. In other words, the said annular ribbing projects from the base 6 of the closure 1, projecting into the annular space 24 of the said closure.

[0034] The said flange 18 and the said lip 22 are solidly fixed to the base 6 of the closure 1 at points close to the ribbing 26 and adjacent to the said ribbing.

[0035] In the state of engagement of the closure 1 with the bottle 2, the ribbing 26 produces a head seal on an annular ledge 3' of the end portion 3' of the neck 3 of the bottle 2, being squeezed against the said annular ledge.

[0036] The connection zone 8 between the shell 4 and the base 6 of the said closure 1 provides an annular

shoulder 28 which produces an extension of the said connection zone of the closure projecting towards the interior space 10 of the said closure.

[0037] The state of engagement of the closure 1 with the bottle 2 is attained by actuation of the engagement means, preferably by screwing of the said closure onto the said bottle.

[0038] In the state of engagement, the end portion 3' of the neck 3 of the bottle 2 penetrates, at least in part, into the annular space 24 between the flange 18 and the lip 22, deforming the said flange and the said lip, and effecting the squeezing of the said ribbing 26 onto the annular ledge of the bottle 2.

[0039] The annular flange 18, when deformed, is flexed and convergent towards the central axis X-X of the said base, adhering, at least in part, to the interior surface of the neck 3 of the said bottle.

[0040] In the embodiment of the closure 1 wherein the flange 18 possesses the swelling 20, the said swelling is squeezed onto the interior surface of the neck of the bottle, producing the said internal seal between the flange and the bottle.

[0041] Moreover, in the embodiment of the closure 1 with the flange widening towards the aperture 11 of the closure 1 in the undeformed state of disengagement, the flexion undergone by the flange 18 in the state of engagement with the bottle 2 is greatly accentuated. In consequence, the elastic restoring thrust of the flange 18 is high and produces powerful squeezing of a portion of the said flange against the interior surface of the neck of the bottle.

[0042] The internal seal produced by the flange 18 is made even more pronounced by the swelling 20 which, being squeezed, produces an extensive surface area of adhesion between a portion of the said flange and the interior surface of the bottle 2.

[0043] The annular lip 22, when deformed, is flexed and divergent from the central axis X-X of the base 6, adhering, at least in part, to the exterior surface of the neck of the bottle.

[0044] The flexion of the lip 22 in the state of engagement is such that the said lip interferes with the annular shoulder 28 of the connection zone 8 between the base 6 and the shell 4 of the closure 1. In particular, the shoulder 28 produces a ledge preventing the deformation of the lip 22, which results in a high degree of squeezing of the said lip onto the exterior surface of the neck 3 of the bottle 2.

[0045] Furthermore, the said annular shoulder 28 is configured and positioned in a manner such as to ensure adhesion between the said lip and the exterior surface of the neck 3 of the bottle 2 over an extensive surface area of adhesion.

[0046] In addition, the said annular shoulder 28 produces centring means for centring the end portion 3' of the neck 3 of the bottle 2 intended to engage with the closure 1.

[0047] In other words, the said annular shoulder, es-

pecially when the closure 1 is first screwed onto the bottle 2, which is effected automatically by appropriate machines, ensures correct positioning of the said end portion 3' of the neck 3 of the bottle 2 relative to the closure 1, producing a homogeneous and non-discontinuous contact between the sealing members of the closure 1 (the flange 18, the lip 22 and the ribbing 26) and the surfaces of engagement of the bottle 2 (interior and exterior surfaces and annular ledge 3", respectively).

[0048] The annular ribbing 26, in the state of engagement of the closure 1 with the bottle 2, is squeezed onto the annular ledge 3", producing a further head seal.

[0049] In the state of engagement between the closure 1 and the bottle 2, the flexion of the annular flange 18 and the flexion of the annular lip 22 create a state of deformation in alignment with the annular ribbing 26 which thrusts the said ribbing against the said annular ledge of the bottle 2.

[0050] In this manner, in addition to the squeezing of the ribbing 26 caused by the interference of the said ribbing with the annular ledge 3" of the bottle 2, a further squeezing, caused by a lowering of the ribbing 26 as a consequence of the state of deformation produced by the deformation of the flange 18 and of the lip 22, is generated by the screwing of the closure 1 onto the bottle 2.

[0051] In other words, in the state of engagement of the closure 1 with the bottle 2, the flange 18 and the lip 22 diverge from the annular space 24, widening it. The widening of the space results in a lowering of the ribbing 26 caused by the state of deformation created.

[0052] Furthermore, the state of deformation created in alignment with the ribbing 26 is particularly accentuated by the high degree of flexion of the flange 18 which changes from a non-deformed configuration in which it is divergent towards the aperture 11 of the closure 1 to a deformed configuration in which it is convergent towards the said aperture of the closure 1.

[0053] The annular shoulder 28 of the connection zone 8 between the base 6 and the shell 4 of the closure 1 produces, in addition, centring means which ensure correct positioning of the neck 3 of the bottle 2 relative to the closure 1.

[0054] In other words, the said annular shoulder constitutes a guide for the end portion 3' of the neck 3 of the bottle 2 partly received in the annular space 24 between the flange 18 and the lip 22 of the closure, in a manner such as to produce a uniform contact between the interior surface, the exterior surface and the annular ledge of the bottle 2 and the sealing members of the closure 1.

[0055] Unusually, the present closure system for a bottle, a container and the like possesses a high degree of sealing efficiency, successfully maintaining unchanged the sparkling nature of the product, and ensuring that it is well preserved.

[0056] Advantageously, in addition, the closure system possesses a notable ease of use for the end user, in that it is able to provide a good seal without the need to exaggerate the tightening of the closure onto the bot-

tle. This, as is known, requires excessive efforts by the user for the disengagement of the closure from the bottle, especially at the time of first opening.

[0057] It is clear that a person skilled in the art, in order to meet contingent and specific requirements, will be able to make numerous modifications and variations to the closure system described above, all these however remaining within the scope of protection of the invention as defined in the claims that follow.

Claims

1. Closure system capable of association with a container, a bottle (2) and the like, provided with a base (6) which is developed about a central axis (XX), the said base comprising

- a deformable annular flange (18) projecting from the said base (6) which, in the state of engagement of the closure with the bottle (2), is flexed and convergent towards the axis (XX) of the said base, producing a seal within the bottle (2);
- an annular lip (22), projecting from the said base (6) and, in the state of engagement of the closure with the bottle (2), producing an external seal with the bottle;
- at least one annular ribbing (26), projecting from the base (6) and disposed between the flange (18) and the lip (22) and, in the state of engagement of the closure with the bottle, producing a head seal, being squeezed onto an annular rim (3") of the bottle (2);

the said closure system being characterized in that the annular lip (22), in the state of engagement of the closure with the bottle (2), is flexed and divergent from the said axis (XX) of the said base (6), in a manner such as to create a state of deformation at the ribbing (26) which thrusts the said ribbing against the said annular rim (3") of the bottle (2).

2. Closure system according to Claim 1, wherein the said flange (18) projects from the base (6) of the closure (1) substantially in the direction of the central axis (XX) of the said closure.

3. Closure system according to Claim 1 or 2, wherein the said flange (18), in the undeformed state of disengagement from the bottle (2), is in the shape of a frustum, widening towards an aperture (11) of the said closure (1).

4. Closure system according to Claim 3, wherein the said undeformed widening configuration of the flange (18) is adapted to accentuate the elastic restoring thrust of the said flange against the bottle in

the state of engagement of the closure (1) with the said bottle (2).

5. Closure system according to one of Claims 1 to 4, wherein the said flange (18) provides an exterior surface (18') intended, at least in part, to make contact with the bottle (2), which is shaped. 5
6. Closure system according to Claim 5, wherein the said exterior surface (18') of the flange (18) possesses an annular swelling (20). 10
7. Closure system according to Claim 6, wherein the said annular swelling (20) is disposed in the vicinity of the centre line of the said flange (18). 15
8. Closure system according to Claim 6 or 7, wherein the said swelling is adapted to be squeezed, in the state of engagement of the closure (1) with the bottle (2), producing an extensive surface area of adhesion between the said flange (18) and the said bottle (2). 20
9. Closure system according to any one of the preceding claims, wherein the said lip (22) projects from the base (6) of the closure (1) substantially in the direction of the central axis (XX). 25
10. Closure system according to Claim 9, wherein the said lip (22) possesses a configuration widening towards an aperture (11) of the said closure (1). 30
11. Closure system according to Claim 9 or 10, wherein the said lip (22) possesses a "comma" configuration. 35
12. Closure system according to any one of the preceding claims, wherein the said flange (18) and the said lip (22) are solidly fixed to the base (6) of the closure (1) at points adjacent to the ribbing (26). 40
13. Closure system according to any one of the preceding claims, wherein the said closure comprises, in addition, an annular shoulder (28) disposed within the said closure. 45
14. Closure system according to Claim 13, wherein the said annular shoulder is disposed in the vicinity of a zone of connection (8) between a shell (4) and the base (6) of the said closure. 50
15. Closure system according to Claim 13 or 14, wherein the said annular shoulder (28) is adapted to produce, in the state of engagement of the closure (1) with the bottle (2), correct centring of the said bottle in the said closure. 55
16. Closure system according to any one of Claims 13

to 15, wherein the said annular shoulder is adapted to produce, in the state of engagement of the closure (1) with the bottle (2), a ledge preventing the deformation of the said lip (22).

17. Closure system according to Claim 16, wherein the said ledge preventing the deformation produces an extensive surface area of adhesion between the said lip (22) and the bottle (2).
18. Closure system according to any one of the preceding claims, comprising, in addition, a safety strip (14) connected to a shell (4) of the said closure (1) by means of a weakened portion (16).
19. Closure system according to Claim 18, wherein the said weakened portion (16) is produced by a circumferential succession of webs (16').
20. Closure system according to Claim 18 or 19, wherein the said weakened portion (16) tears on first opening of the said closure (1) of the bottle (1).

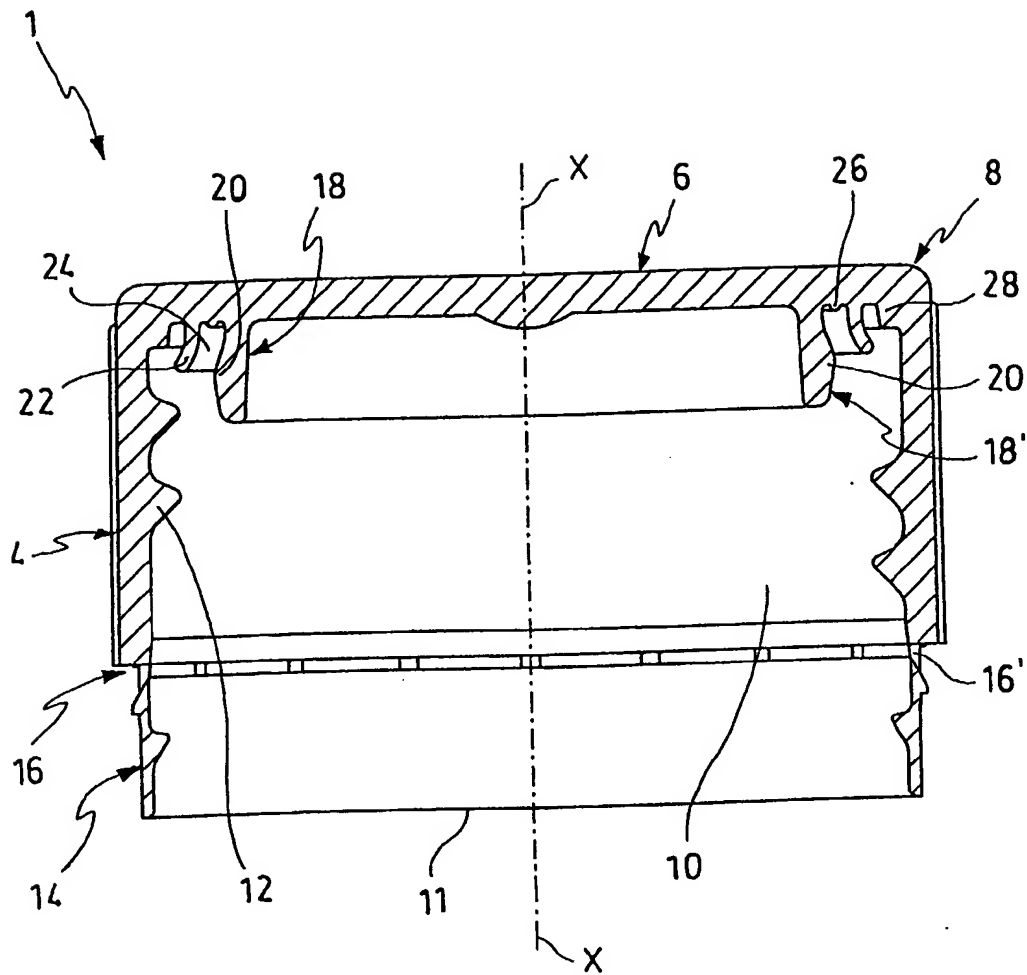


FIG.1

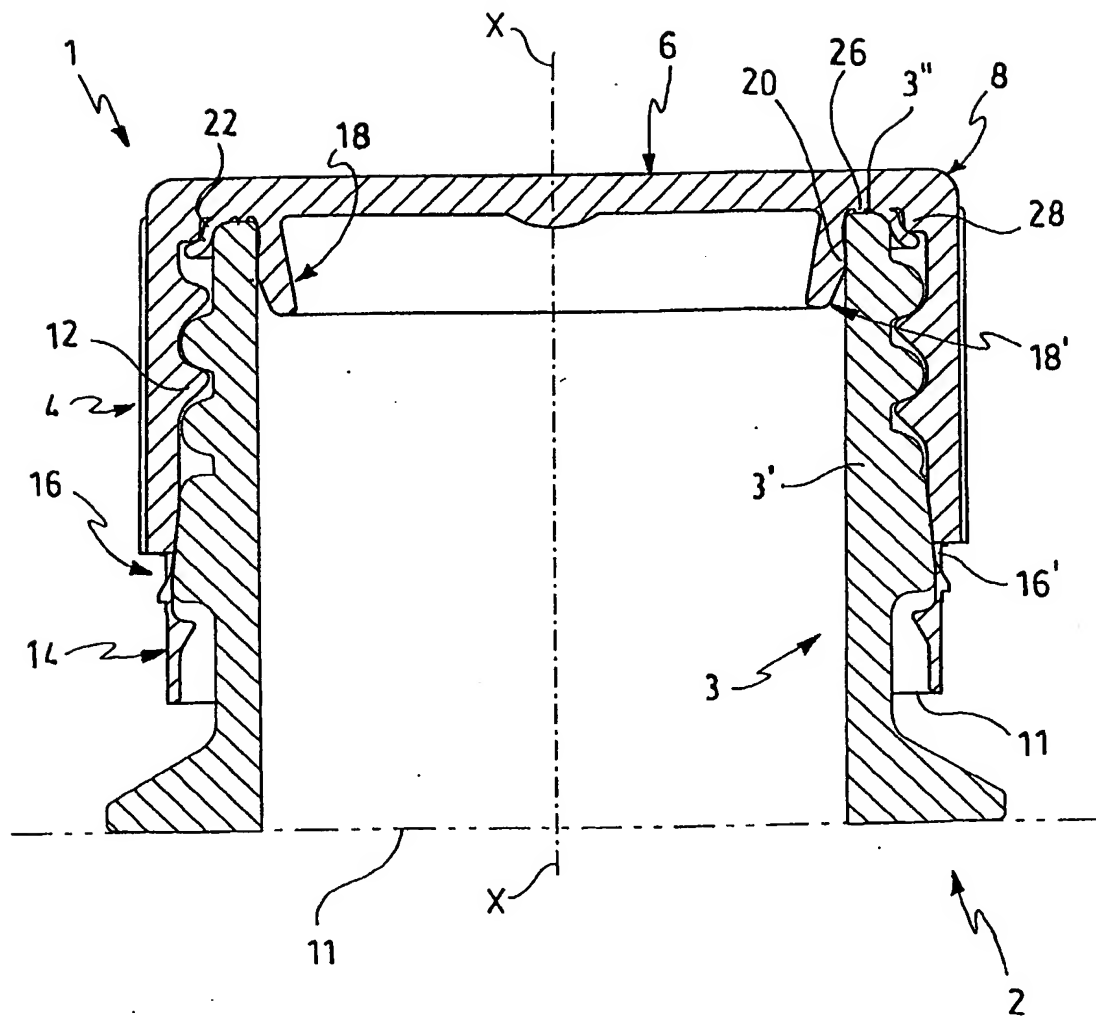


FIG.2



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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0783

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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A		13-17	
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Y	* page 2, column 1, line 37 - page 4, column 5, line 7 *	13-17	
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-/-			
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 10 May 2002	Examiner Seegerer, H
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03-82 (P4/C01)



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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0783

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	WO 00 34133 A (LIMANJAYA TJANDRA) 15 June 2000 (2000-06-15) * page 6, line 11 - line 15; figure 4 *	18-20	
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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 10 May 2002	Examiner Segerer, H
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>& : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03/82 (P/04001)



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Application Number

EP 01 83 0783

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☒ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 01 83 0783

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-20

Closure system

1.1. Claims: 1-12

Specific configuration of the internal seals for a closure comprising three internal seals.

1.2. Claims: 13-17

Internal annular shoulder for a closure system comprising three internal seals

1.3. Claims: 18-20

Additional safety strip for a closure comprising three internal seals

The applicants attention is drawn to the fact that almost all claims are already disclosed by the available prior art.

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 83 0783

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on.
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 01 83 0783

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